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It is to be remembered that the secretions of *Oryz barbarica* are acid, thus in this case excluding the explanation of Radziszewski.

WILLIAM HALLOCK.

MATHEMATICS.

*The Principles of Differentiation in Space-Analysis.** By A. MACFARLANE, D. SC., LL. D.

According to Hamilton the differentiation of a function of a quaternion presents novel difficulties due to the non-commutative character of a product of quaternions. There is in general no derived function, and it is necessary to define the differential in a new manner. Under certain conditions there is an analogue to Taylor's Theorem, but it is very complex, and no use is made of it. Hamilton does not differentiate the general transcendental functions, but only these functions restricted to a constant plane.

The author shows that these anomalies are true of products of vectors, but not of functions of versors. In versor analysis there is a derived function, satisfying a generalized form of Lagrange's definition; and Taylor's Theorem takes on a form similar to that in ordinary analysis, only the order of the two quantities must be preserved. Let x and h denote two versors, then

$$f(x+h) = f(x) + f'(x)h + \frac{1}{2} f''(x)h^2 + \text{etc.},$$

provided the order of the x and h be preserved throughout.

The author finds the derived functions of various transcendental functions in space. He also shows that there are two essentially different meanings of $\sqrt{-1}$; one, when made definite, means a quadrant of rotation round a specified axis; while the other has no reference to direction, but distinguishes the area of a hyperbolic angle from the area of a circular angle. He also remarks that the theory of functions must be imperfect, because it is based upon a complex

number which is restricted to one plane; no account is taken of the two essentially different meanings of $\sqrt{-1}$, and the idea of the versor is not distinguished from that of the vector.

METEOROLOGY.

Neudrucke von Schriften und Karten ueber Meteorologie und Erdmagnetismus.

Dr. G. Hellmann, of Berlin, has undertaken the republication of certain old and rare writings relating to meteorology and terrestrial magnetism which have an important bearing on the history and development of these sciences. Very rare or typographically interesting works are printed in facsimile. Each reprint is preceded by an introduction, containing a general description of the book and its author. Although facsimile publications generally are so dear that only connoisseurs are able to buy them, yet, owing to the aid of the German Meteorological Society and its Berlin branch, the reprints are offered at a relatively low price by A. Asher & Co., Berlin. A few copies may also be had of A. L. Rotch, Blue Hill Observatory, Readville, Mass., at the publishers' prices. Each year one or two of the reprints will be issued, but the whole number will not exceed twelve. The following have already appeared:

No. 1. *Wetterbuechlein von wahrer Erkenntniss des Wetters.* REYNMAN, 1510. 41 pages introduction and 14 pages facsimile. Price 6 M. = \$1.50.

This is the oldest printed meteorological work in the German language and was very popular, having 34 editions in seventeen years. Nevertheless, it is now so scarce that hardly thirty-six copies can be found.

No. 2. *Récit de la Grande Expérience de l'Equilibre des Liqueurs.* BLAISE PASCAL. Paris. 1648. 10 pages introduction and 20 pages facsimile. Price 3 M. = 75 cents. This little work is of the greatest impor-

* A paper read before the meeting of the American Mathematical Society, January 26, 1895. (Abstract.)

tance for the history of physics, meteorology and physical geography, since it furnishes proof of the existence of atmospheric pressure, and forms the basis of measurements of altitudes with the barometer. But three copies of the original are known to exist.

No. 3. *On the Modification of Clouds.* LUKE HOWARD. London. 1803. 9 pages introduction and 32 pages facsimile with three plates. Price 3 M. = 75 cents.

This was the first successful attempt at a cloud nomenclature on which all later schemes are based. The first edition of the original work is very rare.

A. L. ROTCH.

NOTES AND NEWS.

ENTOMOLOGY.

It is well to draw attention to two admirable brief illustrated papers published last year by Ch. Janet on *Myrmica rubra*, one on the morphology of the skeleton and especially of the postthoracic segments (Mém. Soc. Acad. de l' Oise, xv.), the other on the anatomy of the petiole (Mém. Soc. Zool. France, 1894). We regret we have not space for a full analysis of each, but they will be found of great interest to morphologists and hymenopterists. The clear illustrations are pretty sure to find their way into text-books.

The annual presidential address before the Entomological Society of London by Capt. H. J. Elwes is on the geographical distribution of butterflies and deals largely with those of North America.

Dr. Ph. Bertkau announces that his health obliges him to give up the admirable annual review of entomology which has appeared in the *Archiv für naturgeschichte* since 1838 under different editors—Erichson, Schaum, Gerstaecker, Brauer and Bertkau. Entomologists are under great obligations to Dr. Bertkau for the excellence of his summaries, their completeness and the

promptness with which they have appeared. A still prompter method of rapid publication in all branches of biology is now being planned, which is at the same time a practical combination of all the current reviews—a consummation devoutly to be wished and helped forward.

M. Emile Blanchard was retired November last from the chair of entomology at the Jardin des Plantes, on account of age; his first entomological paper was published nearly seventy years ago; his successor has not yet been announced.

Fire has committed ravages with our entomologists this winter. Mr. J. G. Jack lost his library and collection in Jamaica Plain by the destruction of the building in which they were kept; Prof. C. H. Tyler Townsend lost his valuable dipterological library (nearly complete for America and very full for Europe) by the burning of the warehouse at Las Cruces, N. Mex., while he was absent for a few weeks at Washington; and now comes news that Rev. C. J. S. Bethune's school at Port Hope, Ont., has been burnt to the ground. His loss is estimated at eighty thousand dollars.

GENERAL.

AMONG the articles of scientific interest in the popular magazines for March are the following: Hermann von Helmholtz; Thos. C. Martin—*Century*. The World's Debt to Medicine; John S. Billings—*The Chautauquan*. Weather studies at Blue Hill; Raymond L. Bridgman—*New England Magazine*. Heredity; St. George Mivart—*Harper's Magazine*. The Direction of Education; N. S. Shaler—*Atlantic Monthly*.

PROFESSOR CARHART will deliver the address at the dedication of the Hale scientific building of the University of Colorado, on March 7th. His subject is *The Educational and Industrial Value of Science*.

THERE will be held at Vienna between the months of January and May, 1896, an